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# THE GEOGRAPHICAL REVIEW

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## THE HANGING GARDENS OF THE MESA DE MAYA\*

By CHARLES R. KEYES

Like an emerald solitaire, the hanging gardens of the Mesa de Maya are set in the tawny desert of our Southwestern tableland. A wonderful mass of verdure poised high above a boundless, waterless waste, this oasis is almost unique among the garden spots of earth, for it is mounted on a mile-high pedestal and is nearly 10,000 feet above sea level. Its even surface is richly fertile, intensely cultivated, and extraordinarily productive. Then, too, it is the home of a compact agricultural settlement which is as completely isolated from the rest of the world as if it were on an island in mid-ocean. Indeed, dwellers on the mesa look out upon the dreary monotonous sea of land about them as islanders do upon the ocean.

### AN AGRICULTURAL EDEN

The existence of this community of thrifty and prosperous Northern farmers on the heights of a lonely rock in a Southwestern desert is really

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\* As explained in the article, the author uses "Mesa de Maya" as a collective term to designate the group of mesas which extend eastward from the Rocky Mountain front at the Colorado-New Mexico boundary, although the term strictly applies only to the most prominent, an eastern, member of the group. Selecting from the somewhat divergent nomenclature in the literature and on the maps the names that seem most appropriate, we obtain the following, proceeding from west to east (cf. map, Fig. 1): the Rato Mesas, consisting of Raton Mesa, Bartlett Mesa, and Barilla Mesa; Johnson Mesa; Chicorica Mesa; nameless mesa east of Emery Gap; Long's Mesa; Mesa de Maya; Fowler Mesa; and Mt. Carrizo. The mesa-top farms with which the article deals occur on the Raton Mesas, particularly Barilla Mesa, and on Johnson Mesa.

The sources on which the map, Fig. 1, is based are of unequal value. Only a third of the area is covered by the topographic sheets of the U. S. Geological Survey, and these are of different dates and scales; for the remainder resort has to be had to the maps of the earlier government surveys and to state maps. For the greater part of the United States this situation is still typical of that which confronts him who tries to represent, on other than general scales, a given part of its surface. The maps used are the following: (a) topographic sheets, 1:125,000, Spanish Peaks (surveyed in 1895), Elmore (1895), Mesa de Maya (1890), Mt. Carrizo (1890); 1:62,500, Brilliant (1912-13), Raton (1911-12), Koehler (1915); (b) others: U. S. Geographical Surveys West of the One Hundredth Meridian (Wheeler Survey), topographic atlas sheet No. 70 (A), 1874-76; General Land Office map of New Mexico, 1:760,320 (1896 edition, with relief in hachuring; on latest, 1912, edition relief is in characterless hill-shading); Clason's Industrial Maps of Colorado, 1:650,000 (Denver, 1913), and of New Mexico, 1:750,000 (1908), for roads; Southern Pacific Company railroad map of the United States west of the Mississippi, 1:760,320 (1910), for railroads.—EDIT. NOTE.



one of the agricultural marvels of our day and country. There, where a mile above the insufferable, barren waste is enjoyed the summer climate of the Upper Mississippi valley, are raised harvests of wheat and corn and oats more bountiful than in equal areas anywhere in the Northern States. Apple orchard and vineyard reproduce New England and New York. Vegetable patches surpass the truck lands of New Jersey and Maryland. It is the sole spot in all the vast Southwestern desert where irrigation is not resorted to in order to bring forth abundant crops. It is the westernmost extension of Eastern gardens into the arid country, a last lingering trace of a bygone time before aridity spread its withering touch over the land.

#### APPLICATION OF THE TERM MESA DE MAYA

It will be necessary to explain in some detail the application of the term Mesa de Maya. The name itself is of Spanish origin and signifies "armored tableland" (*malle*=mail, armor), a typically apt term for a natural stronghold. Specifically it is applied to a single mesa of southeastern Colorado, but the term well describes a whole series of mesas of like origin, and physiographers, with an eye to the genetic aspects of the landscape, extend the title so as to include the whole of the former vast highland plain of which the present elevations are merest remnants.<sup>1</sup> These remnants owe their preservation to a thick capping of basalt. At Fisher's Peak, the most westerly extension of the mesas, the basalt has a maximum thickness of 500 feet. Of more or less columnar structure, it forms a sheer-walled brow to the table mountain, which thence falls by a steep declivity of 3,000 feet to the surrounding plains. The old plain of which these mesas are all but vanquished vestiges is inclined slightly to the eastward. At the Rocky Mountain front it has an elevation of about 10,000 feet above mean tide. On the Texas line, 130 miles away, it declines to about 5,000 feet above sea level.

#### ORIGIN OF THE MESA DE MAYA

The Mesa de Maya plain appears to have been of vast expanse in Tertiary time and to have formed the general upland surface of this part of the American continent. Of the old Tertiary peneplanation level little or nothing remains outside of the mesa tops. The attainment of its present high position is regarded as having taken place in Late Tertiary times. Since desert conditions began to set in about the same time there is every reason to believe that the magnitude of the erosion is represented by the difference between this old peneplane level and the present plains level—an interval of 5,000 or 6,000 feet, or something over a mile of thickness. There are also many considerations supporting the assumption that this area

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<sup>1</sup> R. T. Hill: *Physical Geography of the Texas Region, U. S. Geol. Survey Topogr. Atlas of the United States*, Folio 3, 1900, p. 8.

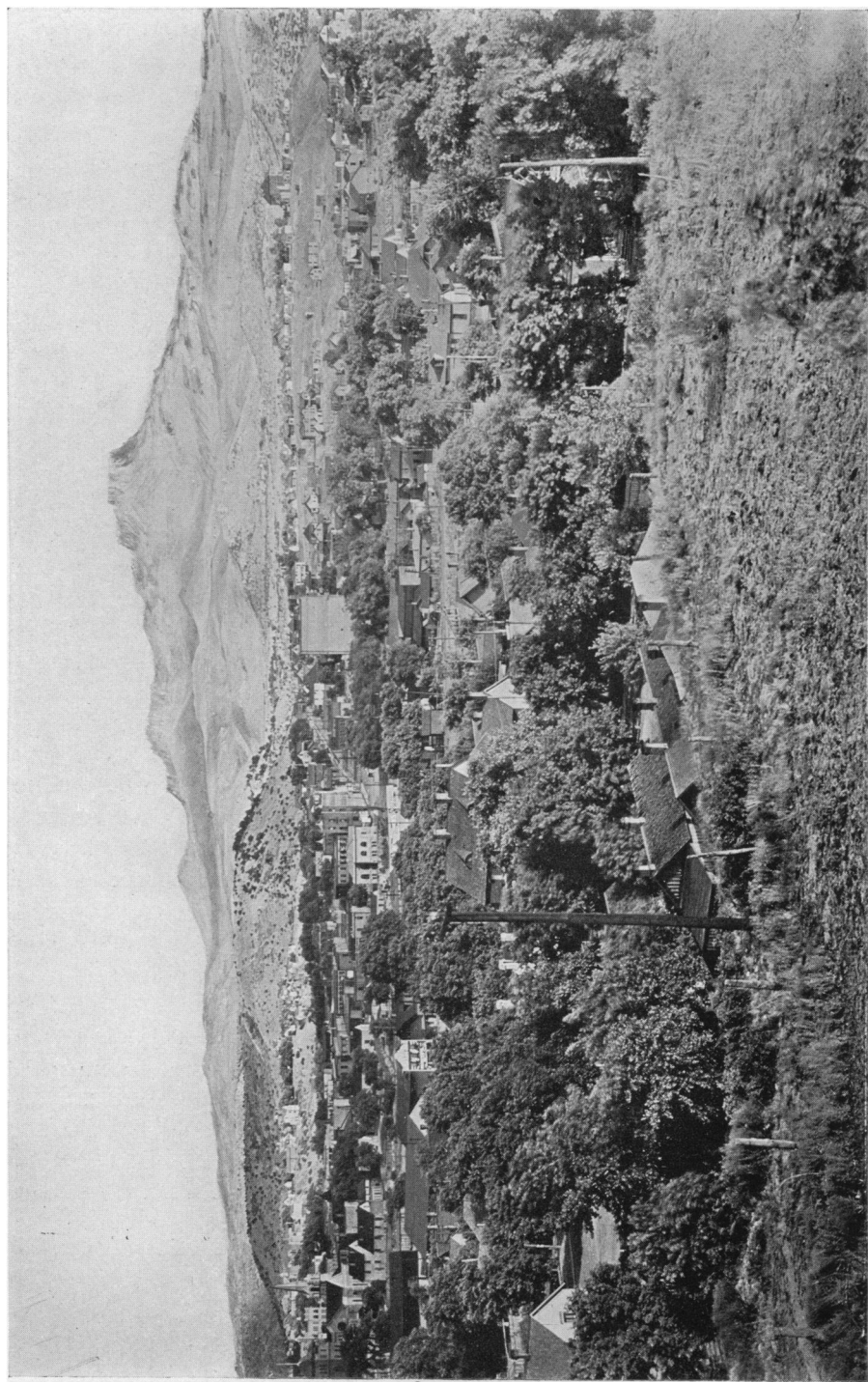


FIG. 2—Fisher's Peak, an outlying spur of Raton Mesa. Trinidad, Colo., in the foreground. (See also the view in *Geologic Atlas of the United States: Folio Elmore* (No. 58), Fig. 2, U. S. Geol. Survey, 1899.)

before uplift was a vast plain and not a mountainous tract when the arid climate was inaugurated. The inappreciable aid of stream corrasion in this prodigious regional depletion is supported by the very prevalence of aridity itself. This region is one of the best extant demonstrations of the almost boundless potency of the wind in re-forming the face of the earth. The chief physiographic interest attached to the Mesa de Maya is, therefore, the novel manner of its depletion and the convincing evidence it affords of the tremendous potency and prodigious effects of eolian erosion. Nowhere else are the proofs of general land lowering through wind action better displayed.

### THE WIND-ERODED LANDSCAPES

When once plainly discriminated, wind-graved landscapes are seldom mistaken for any other kind. Their individuality is very strong. Desert mountains rising abruptly out of the sea of earth around them impart the characteristic form of *inselberg* landscapes. The girdled mountains attest the vigor of natural sand-blast action and its maximum effectiveness at the plains level. Plateau plains of the desert manifestly represent former levels of the general plains surface. The notable absence of foothills, the frequency of rock floors, the smoothness of the wind-beveled surfaces are all unmistakable characteristics.<sup>2</sup>

### THE MESA GARDENS

In most arid lands the refreshing oasis is met with by descent into some hidden valley or gorge where the ground-water table reaches the surface. Thus invariably occur the oases of the Sahara. Of this nature, also, are the regions, famous in antiquity as the Gardens of the Hesperides, nestled under the beetling cliffs which form the border of the high, dry tableland of Cyrenaica. On the contrary, the gardens of the Mesa de Maya in their high-hanging situation are reached only after an arduous climb of a mile of elevation with a dozen miles of winding and twisting among bare rock.

Their elevation above sea level is not much less than 9,000 feet and they are therefore practically limited to the high mesas immediately south of Trinidad (see map). Fisher's Peak, an outlying spur of the Mesa de Maya, is, however, a point of faulty perspective. As viewed from Trinidad, ten miles away and 4,000 feet below, on the Atchison, Topeka and Santa Fé Railway, the flat summit is hardly apparent. To the gardens spread out over the top of the mesa the ascent is steep, a part of the wagon road near the end being blasted out of the living rock, where once was only the narrow trail of the mountain goat and of the fierce cougar.

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<sup>2</sup> See several papers by the author, including: Competency of Wind in Land Depletion, *Monthly Weather Rev.*, Vol. 45, 1917, pp. 57-58; Deflative Scheme of the Geographic Cycle in an Arid Climate, *Bull. Geol. Soc. of Amer.*, Vol. 23, 1912, pp. 537-562; Deflation and the Relative Efficiencies of Erosional Processes under Conditions of Aridity, *ibid.*, Vol. 21, 1910, pp. 565-598; Lineaments of the Desert, *Pop. Sci. Monthly* Vol. 74, 1909, pp. 19-30.

The cool green paradise of the summit flat which suddenly presents itself as one reaches the end of the ascent is a most pleasing and surprising contrast to the insufferably hot and desolate desert that is left below.

#### VULCANISM AND THE DESERT

The view over the desert from the Armored Table is extraordinary. To the more usual features of the desert are added the effects of vulcanism. Black basaltic rivers stretch out toward the horizon until lost in the

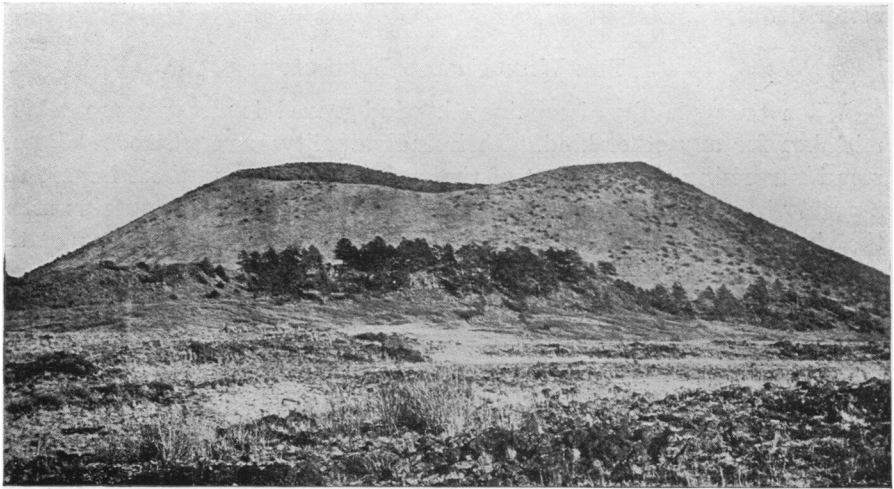


FIG. 3—Mt. Capulin, a recent ash cone in the volcanic district south of the mesa region. (Reproduced, by permission, from *Bull. Geol. Soc. of Amer.*, Pl. 81, Vol. 17, 1905.)

distance. Huge volcanoes studding the plains surface look like molehills on a lawn. Majestic Mt. Capulin is a recent ash cone compared with which that of Vesuvius sinks into insignificance. It rises 3,000 feet above the base and its gigantic caldron is half a mile across. It is perhaps the most perfect volcanic cone in existence. Local tradition places its last eruption within the century. Certain it is that snow falling on its flanks melts instantly. It is the most recently active volcano in the United States, Lassen Peak in California excepted.

Interesting as the desert landscape may be to the physiographer it is inexpressibly dreary to most travelers. "The scant grass is low, colorless, mossy, and of a perishing look; shrubs and soapweed are stunted, and the bony cactus writhes like some grisly skeleton; the very stones seem burnt to cinder. One vainly looks for the flight of a bird such as cheered the eyes of Thalaba in the desert; no bee nor fly hums in the empty air; and save the horned toad, the genius of desolation, there is no living thing. The place is the very battle ground of the elements. In winter it is made fearful by raging storms of snow and wind; in summer by the scorching sun or suffocating dust storm."

## THE OASIS AND ITS NATURAL WEALTH

But let the traveler turn his gaze across the mesa. Instantly he is transported in fancy to some Northern farm scene, with its manifold evidences of bounty, thrift, and contentment. The billowy wheat just turning amber for the plentiful harvest, the waving corn, the broad green meadows with some of last year's hayricks still unused, the close-cropped pastures crowded with fat, contented herds, the trim young orchards with boughs already groaning under their burden of luscious fruit, and the kitchen

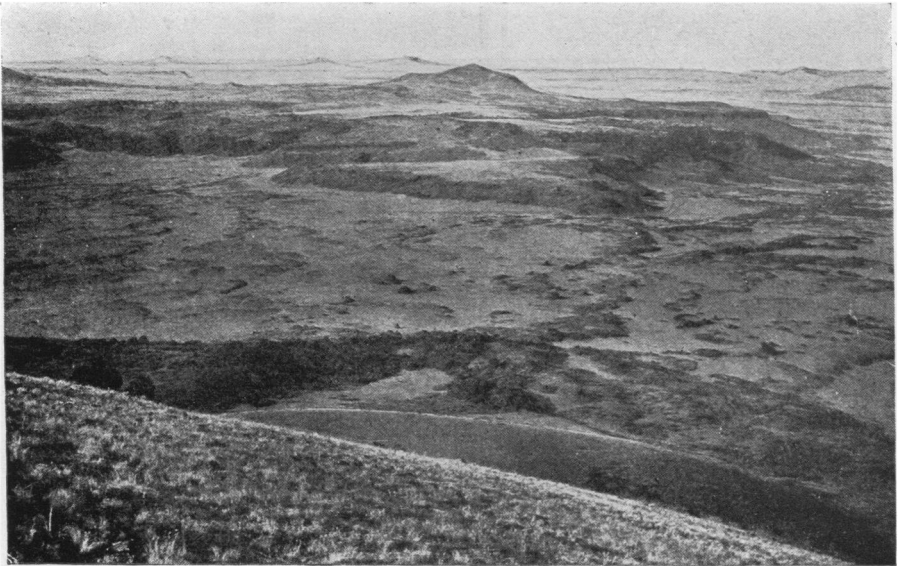


FIG. 4—View southwest from Mt. Capulin over the desolate volcanic district. (Reproduced, by permission, from *Bull. Geol. Soc. of Amer.*, Pl. 84, Vol. 17, 1905.)

gardens full of varied and useful vegetables dispel all thought of such things as deserts. In the midst of all are cosy, substantial cottages and capacious barns such as are characteristic of rural prosperity in the great farming states. Even spring-house and dairy are not wanting.

Where in all the world is a land of plenty more compactly displayed than on this high-hanging oasis of an American desert? The summer sojourner in Colorado is well repaid for a brief visit to this unique freak of nature. The winter traveler to California profitably breaks a long journey by a day off at Trinidad for a drive out to the sky farms. To the geographer and the student of man and his environment a visit to the high-perched gardens of New Mexico is an unforgettable revelation. If the hanging gardens of Babylon were one of the seven wonders of the ancient world, surely the hanging gardens of the Mesa de Maya are among the seven natural wonders of the modern world.

An unlooked-for factor that makes the Mesa de Maya all the more inhabitable and capable of wide industrial expansion is the presence of an



abundance of excellent fuel. In this almost treeless tract wood is scarce. Mineral fuel is plentiful. The entire mesa is underlain by thick seams of fine coal. Much of this coal is of the coking variety. Coke making is already a large industry at the foot of the mountains. Elmore and Starkville coking ovens compare favorably with those of Connellsville, Pennsylvania. At present their output is used by the steel mills at Pueblo and by the smelteries generally throughout the Southwest and Mexico. One of the coal seams lies only a few feet beneath the lava cap of the mesa. Thus it chances that some of the highland farmers have coal mines in their back yards just as the thrifty New Englander has his woodpile.

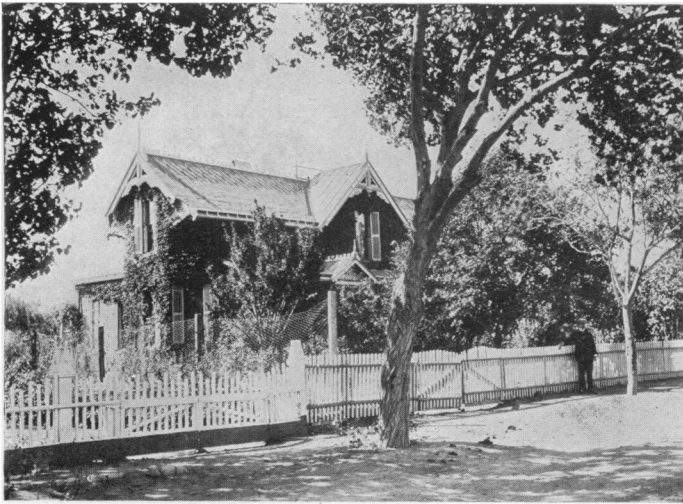


FIG. 5—A typical mesa-top farmhouse. The high elevation of the mesas, with their consequently greater rainfall, creates conditions akin to those of the Upper Mississippi valley or the Northern States in the midst of the Southwestern desert.

#### CLIMATIC EXPLANATION OF THE OASIS

After all, however, these high-hanging gardens of the Mesa de Maya are really not phenomena so anomalous as appears at first glance. They represent merely a specialized case of a widespread climatic feature of mountainous deserts. Throughout the mile-high desert range country with its torrid summer climate the two-mile-high mountain tops enjoy temperate conditions. Although the annual rainfall on the plains at the piedmont is only a few inches, on the summits it is frequently as much as 30 to 40 inches a year, about what it is in the Upper Mississippi valley.

The lofty Mesa de Maya differs from other desert ranges only in the circumstance that because of its peculiar geologic structure it possesses an extensive flat top enabling soil to accumulate and cultivation to take place, whereas other mountains are steep and bare and make farming precarious or impossible. Thus among geographic curiosities of the continent the great Armored Table stands without rival.